RESPONSE TO COMMENTS FROM THE MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION FOR SITE 7 DRAFT SUMMARY REPORT OF THE GROUND-WATER AND SOIL INVESTIGATION AT NAVAL AIR STATION, BRUNSWICK, MAINE

COMMENTOR: Claudia Sait **DATED: 2 November 2001**

GENERAL COMMENTS:

1. The Department cannot agree with the Navy that a natural source of cadmium exists at the site, based on the present data collected and the contents of this report. Sufficient evidence to the contrary was presented that points to an anthropogenetic source. An anthropogenetic source was found at TP-1, just upgradient of the contaminated well MW-NASB-094 and the black peat sampled contained no detectable cadmium. The report needs to be revised to downplay the possibility of naturally occurring cadmium until supporting evidence is available.

   Response—We believe that the hypothesis included in this report, that the naturally occurring ground-water geochemical conditions at Site 7, and in particular near MW-NASB-094, may be contributing to the reported cadmium concentrations in ground water is valid based on site data and the scientific literature. Please note that this report states in Section 3.1 that a combination of naturally occurring sources of cadmium and anthropomorphic sources may have resulted in ground-water impacts. We agree that potential anthropomorphic sources were encountered and that these potential sources were removed during test pit activities. These items included corrugated metal, a small amount of corroded material within a pipe, and a small amount of blue crystals. The small volume of these items, and their position above the water table, make a direct correlation to site ground-water data difficult to establish conclusively. It is possible that the combination of these items, in conjunction with the significant peat layer near this well, may have resulted in elevated cadmium concentrations in the ground water.

   Because this site was being investigated for ground-water impacts, a direct correlation of soil cadmium concentrations and ground-water concentrations are very difficult to demonstrate conclusively. In order to more clearly note that a combination of natural conditions and anthropomorphic sources are being considered as a possible reason for ground-water impacts, the text of Section 3.1 will be changed as noted below:

   ### *3.1 EVALUATION OF RESULTS*

   The results from the data collected during the 51-hour pumping test, the temporary sampling point ground-water sampling, soil screening using the XRF detector, and visual observations suggest that the source of cadmium at Site 7 appears to be primarily an anthropogenetic condition resulting in leaching of metal debris found to have been buried at the site. Although the possibility of a partially naturally-occurring source was considered, as cadmium tends to bond to organic carbon under all pH conditions encountered in normal waters, the analytical sampling of the organic-rich soil layer encountered during the trench excavation activities was not conclusive in determining the presence of a naturally occurring source material. Similarly, the soil sampling completed in conjunction with identifying the potential anthropomorphic sources (i.e., corrugated metal, a corroded pipe) did not clearly

establish these materials as being a sufficient source to conclusively explain the impacted ground water reported at MW-NASB-094 and the replacement well MW-NASB-099.

Based on the findings of the investigations at Site 7, the abundance of metal debris encountered upgradient from monitoring well MW-NASB-094 is the suspected source of cadmium in the ground water at Site 7. Additionally, the prominent metal leach zone at Trench No. 1, underlain by an isolated dense clay lens, also suggests the occurrence of perched surface drainage conditions upgradient from MW-NASB-094. The absence of a shallow clay lens at MW-NASB-094 may have allowed infiltration of dissolved metal-containing leachate downgradient and directly toward this monitoring well. These subsurface conditions, in conjunction with the abundance of the metal debris uncovered at the site, are expected to have contributed to the detected concentrations of cadmium reported at MW-NASB-094.

2. More metallic source material may yet exist in the subsurface farther north of Test Pits 3 and/or 4. The pattern of cadmium concentrations in ground water during the pumping test is that the pumped well (MW-NASB-094) water had higher cadmium than the nearest ground-water sampling points (Temp 3 and Temp 4). Unfortunately, the temporary sampling points were installed after the pumping test, and therefore the cadmium distribution under a stressed system was not determined. Water from a pumped well might be expected to show less cadmium due to dilution effects, unless that well happened to be installed where in situ concentrations are highest. Because buried source material was found away from the pumped well (upgradient at TP-1), MEDEP reasons that MW-NASB-094 is not located directly at the source of cadmium. It may be necessary to look to the northwest of T-3.

   Response—While it is possible there could be undiscovered buried material further north of T-3, we consider the excavations completed to date to be sufficient to evaluate whether ground water at MW-NASB-094 was likely to have been impacted by local sources. A significant area was excavated near MW-NASB-094, and further investigations more distal to this well point are believed to have limited value.

   The analytical sampling results showing the highest cadmium concentrations at MW-NASB-094 compared to Temp-3 and Temp-4 were interpreted in this report to indicate that this well was located in the area with highest ground-water concentrations of cadmium. The hypothesis noted in this comment, that water from a pumped well might be expected to show less cadmium due to dilution, while possible, is considered to be less likely than concluding that MW-NASB-094 is in fact located in the highest area of the cadmium-impacted ground water. Site analytical data completed to date confirm that the highest ground-water concentrations are noted at the MW-NASB-094/099 area, including the analytical results taken from Temp-3 and Temp-4 during this investigation. Therefore, the Navy does not feel it is necessary to look further northwest of T-3 based on the existing site data.

3. Based on the above discussion of sampling results and spatial relationships, it is likely that not enough of the source was removed to cause ground water concentrations to decline with time below the MEG of 5 µg/L. This remains to be seen.

Response—The site ground water will continue to be monitored to determine if cadmium concentrations drop below the 5 µg/L MEG. The Navy does not believe a soil "source area" remains at this site based on the extensive excavation and removal action completed as part of this investigation.

4. The report could use a thorough editorial reading, as words are missing or repeated in several places.

   Response—The final version of this report will be reviewed for these types of typographical errors.

SPECIFIC COMMENTS:

5. ***Page 2—Summary of Site 7 Investigation Activities, 2.0, 2nd and 3rd sentence***—There has been no soil source of cadmium identified during previous investigations. Therefore, the reported dissolved cadmium concentrations in the ground-water samples collected from MW-NASB-094 may be the result of local geochemical conditions, such as elevated total organic carbon, bicarbonate concentrations, and/or changes in pH.

   The RI/FS investigations in the late 1980's did not target the finding of a source for cadmium, even though detection's in ground water over the MEG occurred at one well. However, the RI report states: "A thin stratum of blue-gray crystals was observed in two test pits (i.e., TP-702 and TP-704) in the northern portion of the site. These crystals are believed to be the result of battery acid disposal, as reported in the IAS.

   It is very apparent to MEDEP that a contaminant source did (or does) exist on site. The connotation that the cadmium in groundwater could be unrelated to the Navy's activities is highly doubtful and not substantiated by the data collected. (Also see general comment 1.)

   Response—Please see the response to General Comment No. 1, and the associated proposed changes to Section 3.1. The Navy's position is that a combination of anthropomorphic and naturally occurring site conditions is a valid explanation for the elevated cadmium concentrations in ground water at MW-NASB-094.

6. ***Page 6—Excavation and Visual Survey, 2.2.2.1, 3rd Bullet, and Page 7, 3rd dash***—The material sampled was an unknown white material that appeared to be a corroded metal part. This material is suspected to be a potential source for the ground-water impacts at Site 7. A white, powder-like material, which appeared to be metal corrosion, was encountered within Trench No. 1, and analyzed using the XRF detector (...) and a sample collected for laboratory analysis to determine the concentration of cadmium (134 ppm; Table 4). These findings are direct evidence that a source was found. Other metal debris was reported at this location (Test Pit 1). The conclusion that the source of cadmium also includes naturally occurring organic soils encountered on the east sidewall of Test Pit 3 is unsupported, and therefore unwarranted. Particularly so, because the laboratory analysis for cadmium in the organic soils (black peat) resulted in a non-detection (see Table 4). This further substantiates an anthropogenetic sources as outlined in General Comment No. 1.

Response—Please see the response to General Comment No. 1. We agree that the white powder material could be a potential source. Please note that the Navy is not making the assertion that the cadmium is being de-sorbed from the naturally occurring organic soils (i.e., peat layer) encountered at this location. Instead, we believe the organic material naturally present in ground water (represented at suspended and dissolved total organic compounds) could be resulting in elevated cadmium concentrations. We believe the additional text proposed in Section 3.1 under General Comment No. 1 will make this point clearer to the reader.

8. ***Page 9—Recommendations, 3.2, Paragraph 2***—It is recommended that after two additional rounds of ground-water data are collected from the newly installed monitoring well (MW-NASB-099) which show cadmium concentrations below the State Maximum Exposure Guideline and Federal Maximum Contaminant Level, Site 7 should be considered for No Further Action in concurrence with the State of Maine Department of Environmental Protection.

   From previous emails and discussions at the last Technical Subcommittee meeting, it appears that due to the short timeframe to develop a Proposed Remedial Action Plan and Record of Decision for Site 7 it is unlikely that a No Further Action ROD will be considered. However two rounds of ground-water monitoring with results below the Maine Exposure Guidelines for cadmium is an appropriate trigger to initiate discussions regarding the Long Term Monitoring and Institutional Controls.

   Response—We agree that at this time the Record of Decision for Site 7 is likely to include institutional controls and ground-water monitoring rather than No Further Action. Also we agree that two rounds of ground-water results below MEGs could trigger discussions regarding an amendment to the Record of Decision, if appropriate. We feel that these discussions are best completed during the Proposed Remedial Action Plan and Record of Decision phases for this site. The following changes are recommended for this bullet:

   > *It is recommended that Site 7 be considered for a Final Record of Decision which may include institutional controls for ground-water use. Monitoring of site ground water for cadmium is also recommended. The frequency and analytical methods for this monitoring will be discussed with the NAS Brunswick Restoration Advisory Board, and will be included in the Proposed Remedial Action Plan and Record of Decision. If subsequent ground-water sampling results for two rounds of data are collected from the newly installed monitoring well (MW-NASB-099) which show cadmium concentrations below the State Maximum Exposure Guideline and Federal Maximum Contaminant Level, Site 7 should be considered for a Record of Decision Amendment, possibly to remove the institutional controls and need for continued ground-water sampling. It is anticipated that these discussions will be held with MEDEP and EPA during completion of the site Proposed Remedial Action Plan and Record of Decision.*

9. ***Appendix A-1 and A-2 Drawdown Figures***—These two drawdown graphs show labeling on the time axis that makes no sense. Please correct.

   Response—These graphs represent the available site data for this drawdown test. Please note that this pumping test was completed to determine whether ground-water concentrations of

cadmium could be reduced by short-term pumping. Therefore, limited data collection efforts were focused on establishing site aquifer conditions. These graphs were, however, revised for further clarity.

10. ***Appendix B—Hydraulic Conductivity Estimation and Ground-Water Flow Calculation—*** It is quite unusual that an extended pumping test is performed at a small site, and then hydraulic conductivity estimates do not include analysis of the pumping test. MEDEP understands that the primary purpose of the pumping was to collect water samples over time to analyze for cadmium, however, pumping-test-derived conductivity often is more reliable than averaged slug test results. No response required.

    Response—Comment noted.

11. ***Table 3–X-Ray Fluorescence Detector Responses from Soil Samples, 10th line***—A blue material was encountered in Test Pit 1, and had a XRF response of <35 ppm. According to this report the detection limit (35 ppm) of the XRF detector is above the minimum soil concentration that would account for observed concentrations in the groundwater. However, the material was not analyzed in the laboratory, and is not described or discussed further in the report. In that the RI noted blue crystals in soils in this vicinity, that lack of laboratory analysis of the blue material appears as an obvious oversight. Please discuss the rationale for not analyzing this anomaly.

    Response—The Navy does not consider the decision not to analyze this material in the laboratory to be an oversight. According to the site XRF data which were used as the primary screening criteria to establish which samples may contain elevated cadmium, this material did not indicate elevated concentrations of cadmium were present. In addition, the relatively small volume of this material was not considered to be sufficient to be the source for ground-water impacts at Site 7.

    The following bullet will be added to the end of Section 2.2.2.1 to clarify these points to the reader:

    > *At Test Pit TP1, a small volume of blue crystals was encountered. This material was analyzed by the onsite XRF, which indicated that concentrations of cadmium were below the detection limit of the instrument (<35 mg/kg). Therefore, this material was not analyzed at the offsite laboratory. The small volume of this material that was encountered was not considered sufficient to be a significant source for the cadmium concentrations in ground water at Site 7.*